Patent claims

1. A method for locating metallic objects, or for identifying defects on objects, in which, with the aid of computer driving, the AC voltage energization of at least one transmitting coil is simultaneously effected by a carrier signal, an essentially amplitude- and/or phase-modulated received signal is received by means of at least one receiving coil, and a demodulation of the received signal is furthermore formed using a computer and a Fourier or wavelet transformation method, in such a way that a predefined number of digitally determined measurement results (samples) are fed to such a transformation method, an associated magnitude value and/or phase value is calculated for the frequency of the carrier signal and such a magnitude and/or phase value is used as a direct measure of a present signal strength or phase angle of the demodulated received signal.

2. A method for locating metallic objects, or for identifying defects on objects, in which, with the aid of computer driving, the AC voltage energization of at least one transmitting coil is simultaneously effected by a carrier signal, an essentially amplitude- and/or phase-modulated received signal is received by means of at least one receiving coil, and a multiple demodulation of the received signal is furthermore formed using a computer and a Fourier or wavelet transformation method, in such a way that a predefined number of digitally determined measurement results (samples) are fed to such a transformation method, and a spectrum is calculated, when associated magnitude values and/or phase values are calculated for the frequencies of the carrier signal and at least one further frequency component of said spectrum and the magnitude and/or phase values thus calculated are used as direct measure figures of a present signal strength vector or phase angle vector of the demodulated received signal.

3. The method as claimed in claim 1 or 2, temporally successive Fourier or wavelet transformations being carried out which are based on sets of in each case at least 3 and preferably at least 9 progressively determined measured values (samples).

4. The method as claimed in claim 3, in which sequences of temporally mutually superposed sample sets are used.

5. The method as claimed in one of the preceding claims, in which at least 2 samples are detected and processed per full wave of the carrier signal.

6. The method as claimed in one of claims 1 to 4, in which less than 1 sample is detected and processed per full wave of the carrier signal, and so an intermittent data acquisition in the sense of an undersampling is effected.

7. The method as claimed in one of the preceding claims, which has an additional digitally acting filter method for the signal to be demodulated and/or the harmonics thereof.

8. The method as claimed in claim 7, in which a digital low-pass filter effect is provided for the demodulated signal and the width of the mathematically assigned digital low-pass filter is made variable by virtue of a differently sized number of digitally determined measured values (samples) being fed to a respective Fourier or wavelet transformation, so that a small number of samples effects a larger filter width and a larger number of samples effects a smaller filter width of the mathematically assigned digital low-pass filter.

9. The method as claimed in claim 8, in which the number of samples is chosen to be inversely proportional to the frequency of a frequency signal output by a speed sensor, or is directly proportional to the pulse lengths output by said sensor.

10. An apparatus for carrying out a method as claimed in one of the preceding claims 1 to 9, having at least one transmitting coil, at least one receiving coil, at least one electronic computing unit, at least one analog-to-digital converter, and one or more housing(s) enclosing these devices.

11. The use of the apparatus as claimed in claim 10 or of a method as claimed in one of claims 1 to 9 in industry for the nondestructive identification of faults on semifinished or finished products.

12. The use of the apparatus as claimed in claim 10 or of a method as claimed in one of claims 1 to 9 for the localization of metallic objects in the ground.